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NEW, CONTINUATION, DIVISIONAL OR
CONTINUATION-IN-PART APPLICATION
UNDER 37 C.F.R. §1.53(b)

Attorney Docket No. 9432-000079

Express Mail Label No. EJ 179 205 068 US

Date August 26, 1999

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Hon. Commissioner of Patents and Trademarks
Washington, D. C. 20231

Sir:

Transmitted herewith for filing under 37 C.F.R. §1.53(b) is a patent application for

System and Method for Accessing TV-Related Information Over the Internet

identified by: ☐ First named inventor _____
or ☒ Attorney Docket No. (see above) _____

1. Type of Application

☒ This application is a new (non-continuing) application.

☐ This application is a ☐ continuation / ☐ divisional / ☐ continuation-in-part of prior application No. _____. Amend the specification by inserting before the first line the sentence:

--This is a [continuation/division/continuation-in-part] of United States patent application No. _____, filed _____.

☐ The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied, is considered part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

If for some reason applicant has not requested a sufficient extension of time in the parent application, and/or has not paid a sufficient fee for any necessary response in the parent application and/or for the extension of time necessary to prevent the abandonment of the parent application prior to the filing of this application, please consider this as a Request for an Extension for the required time period and/or authorization to charge our Deposit Account No. 08-0750 for any fee that may be due. THIS FORM IS BEING FILED IN TRIPLICATE: one copy for this application; one copy for use in connection with the Deposit Account (if applicable); and one copy for the above-mentioned parent application (if any extension of time is necessary).

2. Contents of Application

a. Specification of **23** pages;

- ☐ A microfiche computer program (Appendix);
☐ A nucleotide and/or amino acid sequence submission;

☐ Because the enclosed application is in a non-English language, a verified English translation ☐ is enclosed ☐ will be filed.

☐ Cancel original claims _____ of the prior application before calculating the filing fee. (At least one original independent claim must be retained for filing date purposes.)

b. ☒ Drawings on **3** sheets;

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- c. ☒ An unsigned Declaration ☒ is enclosed / a signed Declaration will be filed in accordance with 37 C.F.R. §1.53(f).

The enclosed Oath/Declaration is ☐ newly executed / ☐ a copy from a prior application under 37 C.F.R. §1.63(d) / ☐ accompanied by a statement requesting the deletion of person(s) not inventors in the continuing application.

d. **Fees**

FILING FEE	Number	Number	Basic Fee
CALCULATION	Filed	Extra	Rate
Total Claims	8 - 20 =	0 ×	\$18.00 =
Independent Claims	1 - 3 =	0 ×	\$78.00 =
Multiple Dependent Claim(s) Used			\$260.00 =
FILING FEE - NON-SMALL ENTITY			760.00
FILING FEE - SMALL ENTITY: Reduction by 1/2			
<input type="checkbox"/> Verified Statement under 37 C.F.R. §1.27 is enclosed.			
<input type="checkbox"/> Verified Statement filed in prior application.			
Assignment Recordal Fee (\$40.00)			
37 C.F.R. §1.17(k) Fee (non-English application)			
TOTAL			760.00

- ☒ A check is enclosed to cover the calculated fees. The Commissioner is hereby authorized to charge any additional fees that may be required, or credit any overpayment, to Deposit Account No. 08-0750. A duplicate copy of this document is enclosed.
- ☐ The calculated fees will be paid within the time allotted for completion of the filing requirements.
- ☐ The calculated fees are to be charged to Deposit Account No. 08-0750. The Commissioner is hereby authorized to charge any additional fees that may be required, or credit any overpayment, to said Deposit Account. A duplicate copy of this document is enclosed.

3. **Priority Information**

- ☐ **Foreign Priority:** Priority based on _____ Application No. _____, filed _____, is claimed.
- ☐ A copy of the above referenced priority document ☐ is enclosed / ☐ will be filed in due course, pursuant to 35 U.S.C. §119(a)-(d).
- ☐ **Provisional Application Priority:** Priority based on United States Provisional Application No. _____, filed _____, is claimed under 35 U.S.C. §119(e).

Date August 26, 1999

4. **Other Submissions**

- ☐ A Preliminary Amendment is enclosed.
- ☐ An Information Disclosure Statement, _____ sheets of PTO Form 1449, and _____ patent(s)/publications/documents are enclosed.
- ☒ An unsigned power of attorney
- ☒ is submitted ☒ with the new Declaration and a signed power of attorney will be submitted with the signed Declaration.
- ☐ is of record in the prior application and ☐ is in the original papers / ☐ a copy is enclosed.
- ☐ An Assignment of the invention
- ☐ is enclosed with a cover sheet pursuant to 37 C.F.R. §§3.11, 3.28 and 3.31.
- ☐ is of record in a prior application. The assignment is to _____, and is recorded at Reel _____, Frame(s) _____.
- ☐ An Establishment of Assignee's Right To Prosecute Application Under 37 C.F.R. §3.73(b), and Power Of Attorney is enclosed.
- ☒ An Express Mailing Certificate is enclosed.
- ☒ Other: return postcard

Attention is directed to the fact that the correspondence address for this application is:

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Washington, D.C. 20231

Sir:

EXPRESS MAILING CERTIFICATE

Applicant: Roland Kuhn, et al

Serial No (if any):

For: System and Method for Accessing TV-Related Information Over the Internet

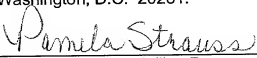
Docket: 9432-000079

Attorney: Gregory A. Stobbs

"Express Mail" Mailing Label Number **EJ 179 205 068 US**

Date of Deposit **August 26, 1999**

I hereby certify and verify that the accompanying **return postcard; \$760.00 check for filing fee; 3-page transmittal letter (in triplicate); 23-page application; 3 sheets of drawings (showing Figures 1-3); 3-page unsigned Declaration and Power of Attorney; along with copies of this Express Mailing Certificate** are being deposited with the United States Postal Service "Express Mail Post Office To Addressee" service under 37 C.F.R. 1.10 on the date indicated above and are addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.



Signature of Person Mailing Documents

SYSTEM AND METHOD FOR ACCESSING TV-RELATED INFORMATION OVER THE INTERNET

Background and Summary of the Invention

The present invention relates generally to interactive television
5 and information retrieval. More particularly, the invention relates to a
speech-enabled system whereby a user's spoken requests for
information are recognized, parsed and supplied to a search engine for
retrieving information pertinent to the user's request.

The number and variety of TV programs available to viewers is
10 growing rapidly. Thus viewers require a rapid, user-friendly way of
searching for broadcasts that suit their tastes and needs. Much
information about TV programs is available on various Internet sites, but
access to those sites requires logging onto a computer and typing in key
words.

15 Ideally, the user would like to be able to obtain information from
Internet sites while he or she is using the television, by making spoken
requests to the television and having it obtain the requested information.
Thus a user could simply tell the television what he or she wants to see:
"Show me any international water polo event", for example, and the TV
20 would access the Internet to find out when and on what channel such a
program is broadcast. Using the information as downloaded, the TV
would also be able to answer questions about the broadcast such as
"What teams are playing?"

By way of further example, the user, viewing a particular program about mountain climbing, might want more information about the tallest mountain peaks and when they were first climbed. The user would like to be able to ask the television to find answers to these questions and
5 then display the results on screen or through synthesized spoken response.

Unfortunately, this type of sophisticated interaction with the television has not been possible. The present invention breaks new ground in this regard. The invention provides a speech recognition
10 system with associated language parser that will extract the semantic content or meaning from a user's spoken command or inquiry, and formulate a search request suitable for supplying to one or more internet search engines. The parser contains a reconfigurable grammar by which it can understand the meaning of a user's spoken request within a
15 given context. The grammar itself may be reconfigured via the Internet, based on knowledge of what the user is currently viewing. This knowledge may be supplied by electronic program guide or as part of the digital television data stream.

The results obtained from the search engines may be further
20 analyzed by the parser, to select the most likely candidates that respond to the user's original inquiry. These results are then provided to the user on screen or through synthesized speech, or both.

For a more complete understanding of the invention, its objects and advantages, refer to the following specification and to the accompanying drawings.

Brief Description of the Drawings

5 Figure 1 is a block diagram of the presently preferred embodiment of the invention;

 Figure 2 is a block diagram depicting the components of the natural language parser of the presently preferred embodiment of the invention; and

10 Figure 3 is a block diagram depicting the components of the local parser of the presently preferred embodiment of the invention.

Description of the Preferred Embodiment

 Referring to Figure 1, a presently preferred embodiment of the speech-enabled information access system comprises a speech
15 recognizer 10 to which input speech is supplied through suitable microphone interface. In this regard, the microphone can be attached by cable or coupled through wireless connection to speech recognizer 10. The microphone may be packaged, for example, within the handheld remote of a television or other information appliance.

20 The output of speech recognizer 10 is coupled to natural language parser 12. The natural language parser extracts the semantics or meaning from the spoken words, phrases and sentences supplied by

the user. As will be discussed more fully below, natural language parser
10 works with a set of pre-defined grammars that are preferably
constructed based on goal-oriented tasks. In the presently preferred
embodiment these grammars may be categorized as one of two types: a
5 fixed grammar **14** and a downloaded grammar **16**.

The fixed grammar represents a pre-defined set of goal-oriented
tasks that the system is able to perform immediately upon installation.
For example, the fixed grammar would allow the natural language parser
to understand sentences such as "Please find me an international water
10 polo event."

Expanding upon the fixed grammar, an optional, downloaded
grammar **16** can be added to the system, giving the natural language
parser the ability to understand different classes of sentences not
originally provided for in the original package. These additional
15 downloaded grammars can be used to expand the capability of the
system periodically (when the system manufacturer develops new
enhancements or new features) or to add third-party enhancements that
the user may be particularly interested in.

For example, if a particular user is interested in playing chess
20 interactively with users around the world, the downloaded grammar can
be augmented to include the necessary grammars to give chess move
commands to the system.

Much of the power underlying the system comes from its ability to access the rich information content found on the internet. The system includes a search engine commander **18** which receives semantic instructions from natural language parser **12**. The search engine commander lies at the hub of a number of information handling processes. The search engine commander is coupled to the internet connection module **20**, which has suitable TCP/IP protocols necessary for communication with a suitable service provider giving access to the internet **22**. The search engine commander formulates search requests, based on the user's input as derived by the natural language parser **12**. The commander **18** formulates search requests to be suitable for handing off to one or more search engines that are maintained by third parties on the internet. In Figure 1 three search engines are shown at **24**. Examples of suitable search engines include: Yahoo, AltaVista, Excite, Lycos, GoTo, and so forth. In essence, the search engine commander **18** communicates with all of the search engines in parallel, sending each of them off on the task of locating information responsive to the user's spoken inquiry.

The search engines, in turn, identify information found on the internet that respond to the user's request. Typically, search engines of this type return a priority score or probability score indicative of how likely the retrieved information is responsive to the user's request. In this

regard, different search engines use different algorithms for determining such probabilities. Thus having the ability to access multiple search engines in parallel improves the richness of the information retrieved. In other words, not all search engines will return the same information for every inquiry made, but the combined effect of using search engines produces richer results than any single search engine alone.

The search engines return a list of links (e.g., hypertext links or URL addresses) that are responsive to the request. Typically, the returned information is sorted by probability score, so that the sites most likely to contain relevant information are presented first.

The returned results are fed back to search engine commander **18**, and search engine commander **18**, in turn, passes the results to the search results processor **26** for filtering. Typically a user of this system does not want to see every piece of information identified by the search engines. Rather the user is typically interested in the best one or two information resources. To filter the results, search engine processor **26** may have optional information filters **28** that are based on user-defined preferences. These filters help processor **26** determine which responses are likely to be more interesting to the user and which responses should be discarded. The presently preferred embodiment updates these information filters on a per-user basis, based on historical data gathered as the user makes use of the system.

A very important item of information in filtering the search results comes from the knowledge of what the user is currently viewing. This information is extracted from an electronic program guide, which may be locally stored as at **30** for access by the search engine commander. The

5 electronic program guide contains information about each program that is available for viewing over a pre-defined time interval. The guide includes the date and time of the program, the program title, and other useful information such as what category the program falls into (e.g., comedy, drama, news, sports, etc.), what actors star in the program,

10 who directed the program, and so forth. Often this information is relevant in determining what information the user is interested in retrieving.

For example, if the user is watching a movie starring Marilyn Monroe, the user may be interested in learning more about this actress' life. The user could thus ask the system to "Tell me more about the main

15 actress' life" and the system would ascertain from the electronic program guide that the actress is Marilyn Monroe.

The information contained in the electronic program guide can be used in multiple ways. The search engine commander can make use of this information in formulating its requests for information that are sent to

20 the search engines **24**. In addition, when the information is returned by the search engines, the search engine commander **18** can pass the relevant electronic program guide data down to the search results

processor **26** along with the search results. This allows the search results processor to use relevant electronic program guide information in filtering the results obtained.

Because the electronic program guide changes over time, it is
5 necessary to update the contents of the electronic program guide data store **30** on a periodic basis. The search engine commander does this automatically by accessing the internet. Alternatively, if desired, the electronic program guide information can be obtained through the television system's cable or satellite link.

10 While the system described above has the ability to access any information available on the internet, a particularly robust embodiment can be implemented by designating certain pre-defined sites that contain information the user has selected as being of interest, or sites designated by the system manufacturer as containing information of
15 interest to most viewers. Information retrieved from such pre-designated sites can be retrieved and communicated to the user more quickly, because there is no need to invoke search engines to scour the entire body of information available on the Internet.

By way of illustration, the system may be pre-configured to
20 access an on-line encyclopedia Internet site which is used to supply commonly requested information about programs the user is viewing. For example, if the user is watching a movie about India, the system

might automatically retrieve relevant statistics about that country and provide them on screen in response to a user's request.

An interesting enhancement of this capability involves the presentation of multimedia data or streaming data from the pre-selected internet web site. By providing screening data, the user is given the experience of actually viewing the supplemental material as a film clip or animation. Such film clips or animations could be viewed, for example, during commercial breaks. Alternatively, if the user is enjoying a television system that provides video on demand, the user could temporarily suspend transmission of the original program to allow viewing of the supplemental information provided from the pre-defined internet site.

The search engine commander, itself, maintains a user profile data store **32** that may be used to further enhance the usefulness of the system. User preferences stored in the user profile data store can be combined with information in the electronic program guide to generate search requests automatically. Thus, if the system has ascertained from previous usage that the viewer is interested in certain international events, the search engine commander will automatically send requests for relevant information and can cause the relevant information to be displayed on the screen, depending on whether such information is suitable in the current viewing context. For example, if important news

about a viewer's home country is found, it could be displayed on screen while the international news is being viewed. The same message might be suppressed if the viewer is watching a movie that may be simultaneously being recorded.

5 The presently preferred embodiment uses a natural language parser that is goal-oriented. Figure 2 depicts components of the natural language parser 12 in more detail. In particular, speech understanding module 128 includes a local parser 160 to identify predetermined relevant task-related fragments. Speech understanding module 128
10 also includes a global parser 162 to extract the overall semantics of the speaker's request.

 The local parser 160 utilizes in the preferred embodiment small and multiple grammars along with several passes and a unique scoring mechanism to provide parse hypotheses. For example, the novel local
15 parser 102 recognizes according to this approach phrases such as dates, names of people, and movie categories. If a speaker utters "tell me about a comedy in which Mel Brooks stars and is shown before January 23rd", the local parser recognizes: "comedy" as being a movie category; "January 23rd" as a date; and "Mel Brooks" as an actor. The
20 global parser assembles those items (movie category, date, etc.) together and recognizes that the speaker wishes to retrieve information about a movie with certain constraints.

Speech understanding module **128** includes knowledge database **163** which encodes the semantics of a domain (i.e., goal to be achieved). In this sense, knowledge database **163** is preferably a domain-specific database as depicted by reference numeral **165** and is
5 used by dialog manager **130** to determine whether a particular action related to achieving a predetermined goal is possible.

The preferred embodiment encodes the semantics via a frame data structure **164**. The frame data structure **164** contains empty slots **166** which are filled when the semantic interpretation of global parser
10 **162** matches the frame. For example, a frame data structure (whose domain is tuner commands) includes an empty slot for specifying the viewer-requested channel for a time period. If viewer **120** has provided the channel, then that empty slot is filled with that information. However, if that particular frame needs to be filled after the viewer has
15 initially provided its request, then dialog manager **130** instructs computer response module **134** to ask viewer **120** to provide a desired channel.

The frame data structure **164** preferably includes multiple frames which each in turn have multiple slots. One frame may have
20 slots directed to attributes of a movie, director, and type of movie. Another frame may have slots directed to attributes associated with the time in which the movie is playing, the channel, and so forth.

The following reference discusses global parsers and frames: R. Kuhn and R. D. Mori, *Spoken Dialogues with Computers (Chapter 14: Sentence Interpretation)*, Academic Press, Boston (1998).

Dialog manager **130** uses dialog history data file **167** to assist in
5 filling in empty slots before asking the speaker for the information.
Dialog history data file **167** contains a log of the conversation which
has occurred through the device of the present invention. For
example, if a speaker utters "I'd like to watch another Marilyn Monroe
movie," the dialog manager **130** examines the dialog history data file
10 **167** to check what movies the user has already viewed or rejected in a
previous dialog exchange. If the speaker had previously rejected
"Some Like It Hot", then the dialog manager **130** fills the empty slot of
the movie title with movies of a different title. If a sufficient number of
slots have been filled, then the present invention will ask the speaker
15 to verify and confirm the program selection. Thus, if any assumptions
made by the dialog manager **130** through the use of dialog history data
file **167** prove to be incorrect, then the speaker can correct the
assumption.

The natural language parser **12** analyzes and extracts
20 semantically important and meaningful topics from a loosely structured,
natural language text which may have been generated as the output of
an automatic speech recognition system (ASR) used by a dialogue or

speech understanding system. The natural language parser **12** translates the natural language text input to a new representation by generating well-structured tags containing topic information and data, and associating each tag with the segments of the input text containing the tagged information. In addition, tags may be generated in other forms such as a separate list, or as a semantic frame.

Robustness is a feature of the natural language parser **12** as the input can contain grammatically incorrect English sentences, due to the following reasons: the input to the recognizer is casual, dialog style, natural speech can contain broken sentences, partial phrases, and the insertion, omission, or mis-recognition of errors by the speech recognizer even when the speech input is considered correct. The natural language parser **12** deals robustly with all types of input and extracts as much information as possible.

Figure **3** depicts the different components of the local parser **160** of the natural language parser **24**. The natural language parser **12** preferably utilizes generalized parsing techniques in a multi-pass approach as a fixed-point computation. Each topic is described as a context-sensitive LR (left-right and rightmost derivation) grammar, allowing ambiguities. The following are references related to context-sensitive LR grammars: A. Aho and J. D. Ullman, *Principles of Compiler Design*, Addison Wesley Publishing Co., Reading,

Massachusetts (1977); and N. Tomita, *Generalized LR Parsing*, Kluwer Academic Publishers, Boston, Massachusetts (1991).

At each pass of the computation, a generalized parsing algorithm is used to generate preferably all possible (both complete
5 and partial) parse trees independently for each targeted topic. Each pass potentially generates several alternative parse-trees, each parse-tree representing a possibly different interpretation of a particular topic.

The multiple passes through preferably parallel and independent paths result in a substantial elimination of ambiguities and overlap
10 among different topics. The generalized parsing algorithm is a systematic way of scoring all possible parse-trees so that the (N) best candidates are selected utilizing the contextual information present in the system.

Local parsing system **160** is carried out in three stages: lexical
15 analysis **220**; parallel parse-forest generation for each topic (for example, generators **230** and **232**); and analysis and synthesis of parsed components as shown generally by reference numeral **234**.

Lexical analysis:

20 A speaker utters a phrase that is recognized by an automatic speech recognizer **217** which generates input sentence **218**. Lexical analysis stage **220** identifies and generates tags for the topics (which do

not require extensive grammars) in input sentence **218** using lexical filters **226** and **228**. These include, for example, movie names; category of movie; producers; names of actors and actresses; and so forth. A regular-expression scan of the input sentence **218** using the keywords involved in the mentioned exemplary tags is typically sufficient at this level. Also, performed at this stage is the tagging of words in the input sentence that are not part of the lexicon of particular grammar. These words are indicated using an X-tag so that such noise words are replaced with the letter "X".

Parallel parse-forest generation:

The parser **12** uses a high-level general parsing strategy to describe and parse each topic separately, and generates tags and maps them to the input stream. Due to the nature of unstructured input text **218**, each individual topic parser preferably accepts as large a language as possible, ignoring all but important words, dealing with insertion and deletion errors. The parsing of each topic involves designing context-sensitive grammar rules using a meta-level specification language, much like the ones used in LR parsing. Examples of grammars include grammar A **240** and grammar B **242**. Using the present invention's approach, topic grammars **240** and **242** are described as if they were an LR-type grammar, containing redundancies and without eliminating shift

and reduce conflicts. The result of parsing an input sentence is all possible parses based on the grammar specifications.

Generators **230** and **232** generate parse forests **250** and **252** for their topics. Tag-generation is done by synthesizing actual information found in the parse tree obtained during parsing. Tag generation is accomplished via tag and score generators **260** and **262** which respectively generate tags **264** and **266**. Each identified tag also carries information about what set of input words in the input sentence are covered by the tag. Subsequently the tag replaces its cover-set. In the preferred embodiment, context information **267** is utilized for tag and score generations, such as by generators **260** and **262**. Context information **267** is utilized in the scoring heuristics for adjusting weights associated with a heuristic scoring factor technique that is discussed below. Context information **267** preferably includes word confidence vector **268** and dialogue context weights **269**. However, it should be understood that the parser **12** is not limited to using both word confidence vector **268** and dialogue context weights **269**, but also includes using one to the exclusion of the other, as well as not utilizing context information **267**.

Automatic speech recognition process block **217** generates word confidence vector **268** which indicates how well the words in input sentence **218** were recognized. Dialog manager **130** generates

dialogue context weights **269** by determining the state of the dialogue.

For example, dialog manager **130** asks a user about a particular topic, such as, what viewing time is preferable. Due to this request, dialog manager **130** determines that the state of the dialogue is time-oriented.

- 5 Dialog manager **130** provides dialogue context weights **269** in order to inform the proper processes to more heavily weight the detected time-oriented words.

Synthesis of Tag-components:

- 10 The topic spotting parser of the previous stage generates a significant amount of information that needs to be analyzed and combined together to form the final output of the local parser. The parser **12** is preferably as "aggressive" as possible in spotting each topic resulting in the generation of multiple tag candidates. Additionally
- 15 in the presence of numbers or certain key-words, such as "between", "before", "and", "or", "around", etc., and especially if these words have been introduced or dropped due to recognition errors it is possible to construct many alternative tag candidates. For example, an input sentence could have insertion or deletion errors. The combining phase
- 20 determines which tags form a more meaningful interpretation of the input. The parser **12** defines heuristics and makes a selection based on them using a N-Best candidate selection process. Each generated

tag corresponds to a set of words in the input word string, called the tag's cover-set.

A heuristic is used that takes into account the cover-sets of the tags used to generate a score. The score roughly depends on the size of the cover-set, the sizes in the number of the words of the gaps within the covered items, and the weights assigned to the presence of certain keywords. In the preferred embodiment, ASR-derived confidence vector and dialog context information are utilized to assign priorities to the tags. For example applying channel-tags parsing first potentially removes channel-related numbers that are easier to identify uniquely from the input stream, and leaves fewer numbers to create ambiguities with other tags. Preferably, dialog context information is used to adjust the priorities.

15 **N-Best Candidates Selection**

At the end of each pass, an N-best processor 270 selects the N-best candidates based upon the scores associated with the tags and generates the topic-tags, each representing the information found in the corresponding parse-tree. Once topics have been discovered this way, the corresponding words in the input can be substituted with the tag information. This substitution transformation eliminates the corresponding words from the current input text. The output 280 of

each pass is fed-back to the next pass as the new input, since the substitutions may help in the elimination of certain ambiguities among competing grammars or help generate better parse-trees by filtering out overlapping symbols.

- 5 Computation ceases when no additional tags are generated in the last pass. The output of the final pass becomes the output of the local parser to global parser **162**. Since each phase can only reduce the number of words in its input and the length of the input text is finite, the number of passes in the fixed-point computation is linearly
- 10 bounded by the size of its input.

The following scoring factors are used to rank the alternative parse trees based on the following attributes of a parse-tree:

- Number of terminal symbols.
- Number of non-terminal symbols.
- 15 • The depth of the parse-tree.
- The size of the gaps in the terminal symbols.
- ASR-Confidence measures associated with each terminal symbol.
- Context-adjustable weights associated with each
- 20 terminal and non-terminal symbol.

Each path preferably corresponds to a separate topic that can be developed independently, operating on a small amount of data, in a

computationally inexpensive way. The architecture of the natural language parser 12 is flexible and modular so incorporating additional paths and grammars, for new topics, or changing heuristics for particular topics is straight forward, this also allows developing
5 reusable components that can be shared among different systems easily.

From the foregoing it will be appreciated that the present invention is well adapted to providing useful information obtained from the internet to the TV viewer. The speech-enabled, natural language
10 interface creates a user friendly, easy to use system that can greatly enhance the enjoyment and usefulness of both television and the internet. The result of using the system is a natural blend of passive television viewing and interactive internet information retrieval.

While the invention has been described in its presently preferred
15 embodiment, it will be understood that the invention is capable of modification without departing from the spirit of the invention as set forth in the appended claims.

Claims

1. A system for accessing supplemental network-resident information about an audio/video program comprising:
 - a network connection through which network-resident
 - 5 information may be obtained;
 - a speech recognizer receptive of a user's input speech request for information about a program;
 - a natural language parser coupled to said speech recognizer for extracting a semantic representation of the user's request for information;
 - 10 a data store for storing a representation of an electronic program guide;
 - a search engine commander coupled to said parser for issuing at least one search request to at least one search engine through said network connection based on said semantic representation and based on
 - 15 said electronic program guide; and
 - a search results processor for receiving search results in response to said search request and for providing at least a portion of the received search results to the user as information about an audio/video program.
 - 20
2. The system of claim 1 further comprising, speech synthesizer coupled to said search results processor for providing the user with synthesized speech information about an audio/video program.

3. The system of claim 1 wherein said network connection provides connection to the internet.

4. The system of claim 1 wherein said search engine accesses at least one predefined site containing information about predefined topics pertaining to an audio/video program.

5. The system of claim 1 wherein said search engine commander includes a user profile data store for storing historical data about prior requests by the user for information.

6. The system of claim 1 wherein said search engine commander includes a mechanism for updating the contents of said electronic program guide data store.

5

7. The system of claim 1 wherein said natural language parser includes a set of predefined goal-oriented grammars.

8. The system of claim 1 wherein said natural language parser includes a data store for storing a set of grammars that are downloaded through said network connection.

Abstract

The system retrieves information from the internet using multiple search engines that are simultaneously launched by the search engine commander. The commander is responsive to a speech-enabled system including a speech recognizer and natural language parser. The user speaks to the system in natural language requests, and the parser extracts the semantic content from the user's speech, based on a set of goal oriented grammars. The preferred system includes a fixed grammar and an updatable or downloaded grammar, allowing the system to be used without extensive training and yet capable of being customized for a particular user's purposes. Results obtained from the search engines are filtered based on information extracted from an electronic program guide and from prestored user profile data. The results may be displayed on screen or through synthesized speech.

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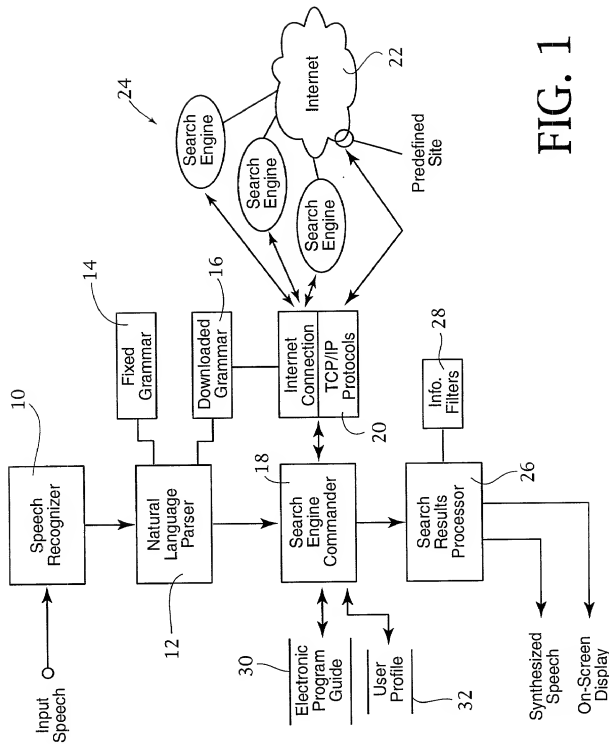
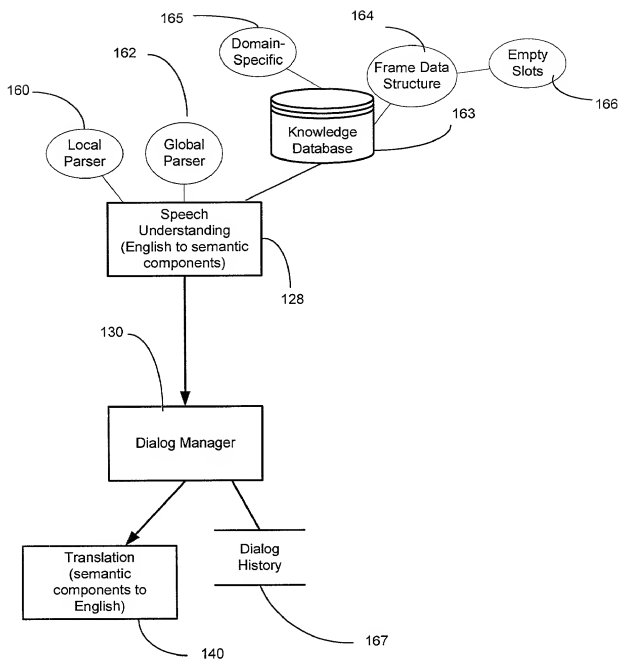


FIG. 1

FIG. 2



DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

System and Method for Accessing TV-Related Information Over the Internet

the specification of which (check one)

☒ is attached hereto.

☐ was filed on _____ as Application
Serial No. _____ and was amended on
_____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application or to the patentability of the invention claimed therein in accordance with Title 37, Code of Federal Regulations, section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, section 119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

PRIOR FOREIGN APPLICATION(S)

Priority Claim

_____ (Number)	_____ (Country)	_____ (Day/Month/Year filed)	<u>Yes</u>	<u>No</u>
_____ (Number)	_____ (Country)	_____ (Day/Month/Year filed)	<u>Yes</u>	<u>No</u>
_____ (Number)	_____ (Country)	_____ (Day/Month/Year filed)	<u>Yes</u>	<u>No</u>

DECLARATION AND POWER OF ATTORNEY

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States Provisional application(s) listed below:

PRIOR PROVISIONAL APPLICATIONS

(application serial number) (Month / Day / Year filed)

(application serial number) (Month / Day / Year filed)

I hereby claim the benefit under Title 35, United States Code, section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

Application Serial No.	Filing Date	Status - patented, pending, abandoned
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint Gregory A. Stobbs, Reg. No. 28,764, and each principal, attorney of counsel, associate and employee of Harness, Dickey & Pierce, P.L.C., who is a registered Patent Attorney, my attorney with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith. I request the Patent and Trademark Office to direct all correspondence and telephone calls relative to this application to Harness, Dickey & Pierce, P.L.C., P. O. Box 828, Bloomfield Hills, Michigan 48303 (248) 641-1600.

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Date: _____

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Date: _____

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Date: _____

Residence: _____

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Fifth Inventor's signature: _____

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